

WHAT IS CLAIMED IS:

1. A process for making a vulcanized rubber article comprising the steps of
(1) kneading at a temperature within the range of about 70°C to about 190°C in a bulk
5 thermomechanical mixer (a) an amino group containing rubbery polymer, wherein said
amino group containing rubbery polymer contains from about 0.1 weight percent to
about 20 weight percent monomer units containing an amino group, (b) from 0.1 to about
25 phr of an organophilic 2:1 layered silicate clay selected from the group consisting of
montmorillonite clays, bentonite clays, hectorite clays, saponite clays, nontronite clays,
10 beidellite clays, fluorohectorite clays, stevensite clays, volkonskoite clays, sauconite
clays, and laponite clays, and (c) at least one conventional rubber compounding
ingredient selected from the group consisting of curing agents, cure accelerators, cure
activators, processing aids, reinforcing fillers, oils, cure retarders, resins, and
antidegradants, to produce a mixed compound; (2) discharging the said mixed compound
15 from the bulk thermomechanical mixer; (3) forming the mixed compound into an article;
and (4) vulcanizing the article.

2. A process as specified in claim 1 which further comprises kneading a
silica coupling agent with the amino group containing rubbery polymer, the organophilic
20 2:1 layered silicate clay and the conventional rubber compounding ingredient in step (1).

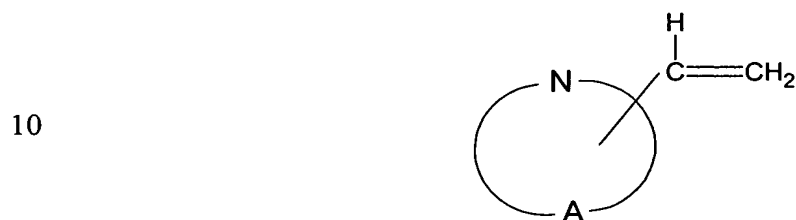
3. A process as specified in claim 2 wherein said amino group containing
rubbery polymer contains from about 0.5 weight percent to about 10 weight percent
monomer units containing an amino group, wherein the composition contains from about
25 1 phr to about 10 phr of the organophilic 2:1 layered silicate clay.

4. A process as specified in claim 2 wherein said amino group containing
rubbery polymer contains from about 0.5 weight percent to about 10 weight percent of
monomer units containing an amino group, wherein the composition contains from about
30 1 phr to about 10 phr of the organophilic 2:1 layered silicate clay, and wherein the ratio
of the silica coupling agent to the 2:1 layered silicate clay is within the range of about
0.1:1 to about 1.5:1.

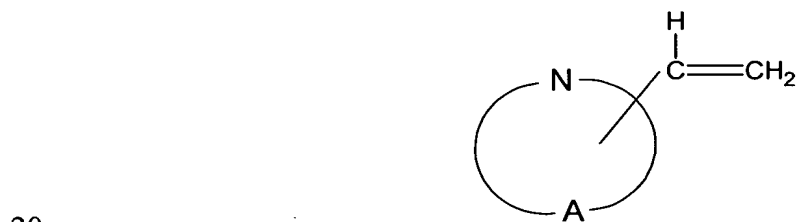
5. A process as specified in claim 4 wherein the amino group is a pyridyl group.
6. A process as specified in claim 4 wherein the amino group is derived from a monomer selected from the group consisting of 2-vinylpyridine and 4-vinylpyridine.
7. A process as specified in claim 1 which further comprises kneading a carbon black with the amino group containing rubbery polymer, the organophilic 2:1 layered silicate clay, and the conventional rubber compounding ingredient in step (1), wherein the carbon black is present at a level which is within the range of about 5 phr to about 100 phr.
8. A process as specified in claim 1 wherein the amino group containing rubbery polymer contains from about 1 weight percent to about 4 weight percent monomer units containing the amino group.
9. A process as specified in claim 2 wherein the organophilic clay is present at a level which is within the range of about 1 phr to about 7 phr and wherein the silica coupling agent is present at a level which is within the range of about 1 phr to about 5 phr.
10. A process as specified in claim 1 which further comprises kneading about 1 phr to about 70 phr of silica with the amino group containing rubbery polymer, the organophilic 2:1 layered silicate clay, and the conventional rubber compounding ingredient in step (1).
11. A process as specified in claim 8 wherein the organophilic 2:1 layered silicate clay is modified with up to about 70 part by weight of a quaternary ammonium salt surfactant.
12. A process as specified in claim 7 wherein the organophilic 2:1 layered silicate clay is selected from the group consisting of smectite, montmorillonite, saponite,

beidellite, hectorite, fluorohectorite, bentonite, nontronite, laponite, vermiculite, and hallosite.

13. A process as specified in claim 1 wherein the amino group containing
5 rubbery polymer is comprised of repeat units that are derived from an amino group
containing monomer selected from the group consisting of (a) heterocyclic amine having
the structural formula:



- wherein A represents a -CH- group or a -CH₂- group and wherein the heterocyclic amine
is aromatic or aliphatic and (b) derivatives thereof heterocyclic amine having the
15 structural formula:



wherein A represents a -CH- group or a -CH₂- group and wherein the heterocyclic amine
is aromatic or aliphatic.

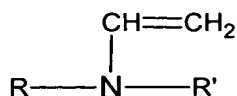
14. A process as specified in claim 2 wherein the silica coupling agent is
25 present at a level which is within the range of about 2 phr to about 4 phr.

15. A process as specified in claim 3 where the rubbery polymer is comprised
of repeat units that are derived from a conjugated diolefin monomer selected from the
group consisting of isoprene and 1,3 butadiene.

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16. A process as specified in claim 1 wherein the amino group containing
rubbery polymer is comprised of repeat units that are derived from an amino group

containing monomer selected from the group consisting of (a) N-vinyl 2-pyrrolidone, (b) N-vinyl caprolactam, and (c) N-vinyl dialkyl amines having the structural formula:

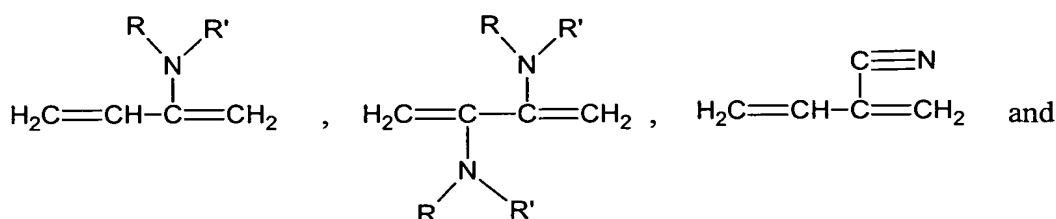


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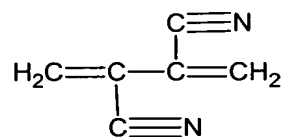
wherein R and R' can be the same or different and represent alkyl groups that contain from 1 to about 10 carbon atoms.

17. A process as specified in claim 1 wherein the amino group containing
10 rubbery polymer is comprised of repeat units that are derived from an amino group containing monomer that is a conjugated diolefin that is substituted with amino and/or cyano groups which is selected from the group of compounds of having the structural formula:

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25 wherein R and R' can be the same or different and represent alkyl groups that contain from 1 to about 10 carbon atoms.

18. A process as specified in claim 11 wherein the quaternary ammonium salt
surfactant is selected from the group consisting of methyl tallow bis-2-hydroxyethyl
ammonium halides, methyl tallow bis-2-hydroxyethyl ammonium alkyl sulfates, methyl
30 tallow bis-2-hydroxyethyl ammonium nitrate, methyl tallow bis-2-hydroxyethyl
ammonium hydroxide, methyl tallow bis-2-hydroxyethyl ammonium acetate, methyl
tallow bis-2-hydroxyethyl ammonium phosphate, dimethyl hydrogenated-tallow (2-
ethylhexyl) ammonium halides, dimethyl hydrogenated-tallow (2-ethylhexyl) ammonium

alkyl sulfates, dimethyl hydrogenated-tallow (2-ethylhexyl) ammonium nitrate, dimethyl hydrogenated-tallow (2-ethylhexyl) ammonium hydroxide, dimethyl hydrogenated-tallow (2-ethylhexyl) ammonium acetate, dimethyl hydrogenated-tallow (2-ethylhexyl) ammonium phosphate, dimethyl dehydrogenated-tallow ammonium halides, dimethyl dehydrogenated-tallow ammonium alkyl sulfates, dimethyl dehydrogenated-tallow ammonium nitrate, dimethyl dehydrogenated-tallow ammonium hydroxide, dimethyl dehydrogenated-tallow ammonium acetate, and dimethyl dehydrogenated-tallow ammonium phosphate.

10 19. A process as specified in claim 3 wherein the silica coupling agent is present at a level which is within the range of about 0.5 phr to about 15 phr.

 20. A process as specified in claim 1 wherein the kneading is conducted at a temperature which is within the range of 145°C to 180°C for a period of 4 minutes to 12 minutes.

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